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# Stripped Mesenteric Flap: A Novel Option for Preventing Anastomotic Leakage in Circumferential Pharyngeal Reconstruction

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**Summary:** Reconstruction of a circumferential pharyngeal defect with a free jejunal flap is a well-established procedure. However, anastomotic leakage often occurs, which can lead to abscess formation, pharyngocutaneous fistula formation, and carotid rupture. Previous reports have described covering the anastomotic site with a mesenteric flap to prevent anastomotic leakage. However, the mesentery is covered by a serosal membrane, which interferes with adhesion and vascular communication. Therefore, we stripped off the serosal membrane to accelerate adhesion to the anastomotic site. We retrospectively studied patients who had a history of radiotherapy and who had received a stripped mesenteric flap in a circumferential pharyngeal reconstruction procedure. We collected the following data: operative time, blood loss, postoperative complications, interval to resumption of oral intake, and duration of hospital stay. We obtained data for 11 patients. The jejunal flap failed in one patient because of arterial thrombosis. One of the other 10 patients developed anastomotic leakage caused by congested mucous membrane necrosis. The patient was treated conservatively and showed no clinical symptoms of infection or inflammation. The 9 remaining patients had no anastomotic leakage. In the present series, although anastomotic leakage was observed in one of 10 patients who underwent circumferential pharyngeal reconstruction using a stripped mesenteric flap, the severity of the leakage was minimized. *(Plast Reconstr Surg Glob Open 2018;6:e2014; doi: 10.1097/GOX.0000000000002014; Published online 15 November 2018.)*

## INTRODUCTION

Reconstruction of circumferential pharyngeal defects with a free jejunal flap is a well-established procedure. However, previous radiation therapy increases the risk of anastomotic leakage, which may lead to abscess formation, pharyngocutaneous fistula formation, and carotid rupture.[1–3] The mesenteric flap was first described by Nahai et al.[4] This procedure is useful for covering the anastomotic site and obliterating dead space. However, the mesenteric flap is covered by a serosal membrane, which acts as a barrier to adhesion and vascularization between the flap and the surrounding tissue. Therefore, we stripped off the serosal membrane before covering the anastomotic site with the flap to prevent anastomotic leakage. This article describes our technique of stripping the serosal membrane and the results of this procedure in 11 patients.

## MATERIALS AND METHODS

We identified patients with a history of radiation therapy who had undergone circumferential pharyngeal reconstruction using the free jejunum and a stripped mesenteric flap from January 2011 to December 2016 at the National Cancer Center Hospital East. This study was conducted after receiving approval from the institutional review board of the National Cancer Center (research ID: 2017–451). Patients who underwent gastric pull-up or placement of a pectoralis major flap were excluded from this study.

A 30-cm jejunal flap was harvested. The median portion of the jejunal flap was used for pharyngeal reconstruction, and the redundant jejunum was excised to utilize the mesenteric flap. Intestinal anastomosis and

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*Received for publication May 27, 2018; accepted September 19, 2018.*

*Supported by JSPS KAKENHI Grant Number 16K20360.*



DOI: 10.1097/GOX.0000000000002014

**Disclosure:** *Supported, in part, by Supported by JSPS KAKENHI Grant Number 16K20360 (to Y.F.). The other authors have no financial interest to declare in relation to the content of this article. The Article Processing Charge was paid for by the authors.*

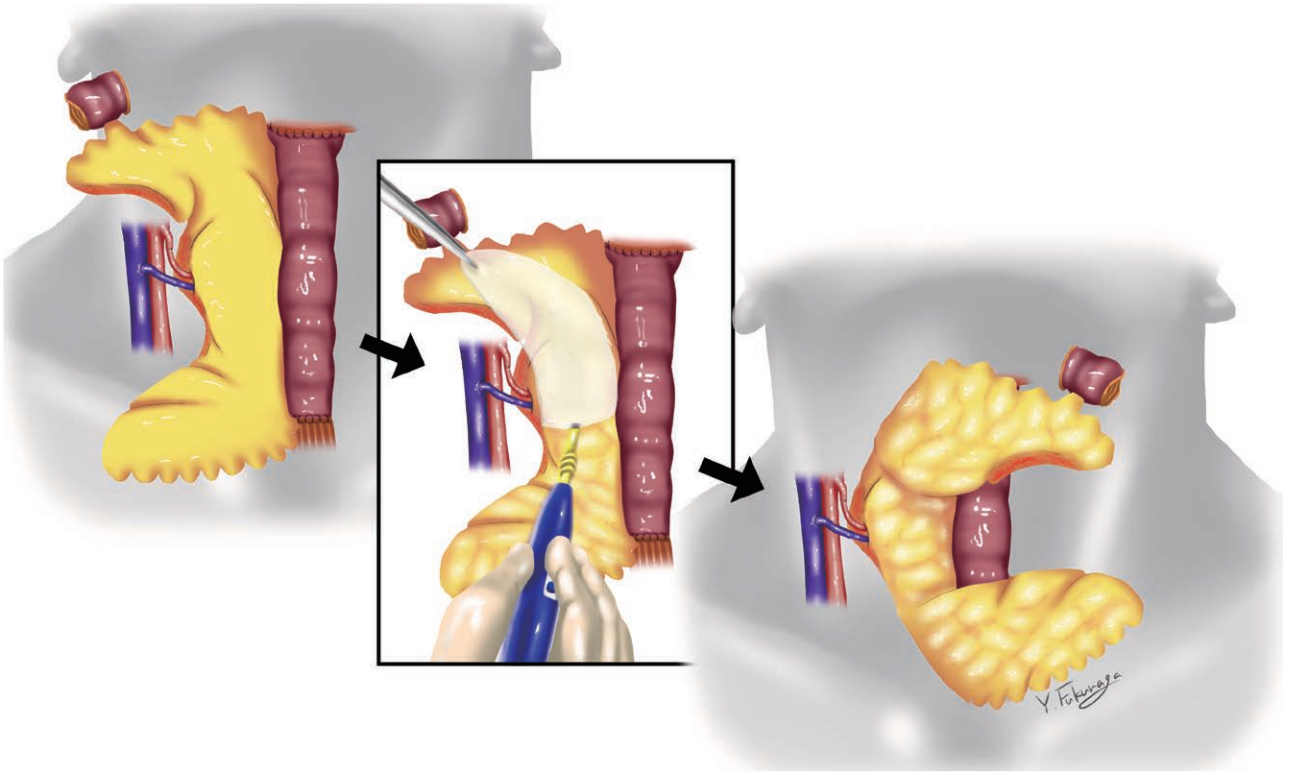

**Fig. 1.** Schema of surgical techniques. One side attached to the anastomotic site or both sides of the serosal membrane were stripped from the mesenteric flap using electrocautery.

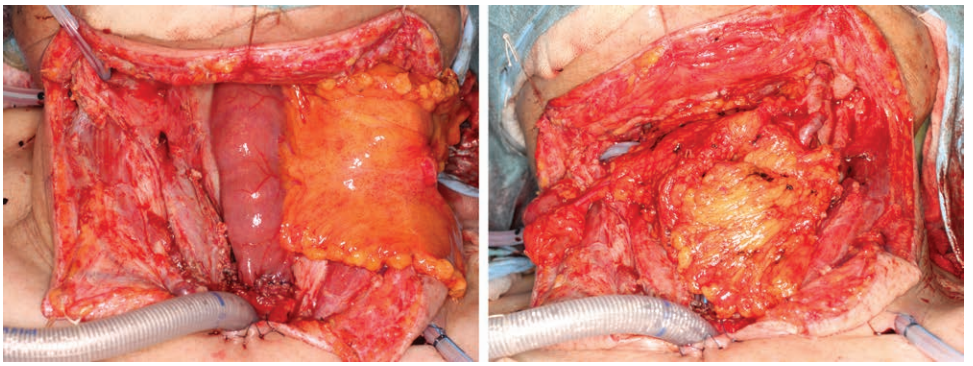

**Fig. 2.** A, Before stripping of the serosal membrane; B, After stripping of the serosal membrane and coverage of the anastomotic site.

vascular anastomosis were performed with our standard method reported previously.[5,6] The serosal membrane of the mesenteric flap was then stripped partially or totally using electrocautery (Figs. 1, 2). The stripped mesenteric flap was turned over the intestinal anastomotic site and anchored with absorbable sutures.

Our standard fasting period before flap harvest in irradiated patients was 2 weeks. A contrast swallow examination was performed after harvest, and patients without radiological leakage began oral intake on the examination day or the day after. If the patient had radiological leakage, the fasting period was prolonged for 1 week.

We checked the operative time, blood loss, postoperative complications, interval to resumption of oral intake, and duration of hospital stay. We distinguished between anastomotic leakage and infection. Anastomotic leakage was confirmed with the contrast swallow examination findings and clinical symptoms. Infection without anastomotic leakage was classified as either major or minor; major infection required an invasive procedure, and minor infection was treated with antibiotics.

## RESULTS

We identified 11 patients who met the criteria for inclusion. The patients' backgrounds and postoperative results are summarized in Table 1. All patients were male, and their mean age was 68.8 years (range, 58–78 years). The primary cancer site was the hypopharynx in 10 patients

**Table 1. Patients' Backgrounds and Postoperative Results**

| Patient | Age (y), Sex | Previous Treatment | Radiation Dose (Gy) | Operative Time (m) | Complication | Initiation of Ingestion (POD) | Hospitalization Periods (d) |
|---|---|---|---|---|---|---|---|
| 1 | 63, M | RT | 70 | 450 | Major infection | 15 | 20 |
| 2 | 73, M | Partial hypopharyngectomy, EMR, RT | 72 | 443 | Minor leak | 21 | 39 |
| 3 | 64, M | CRT | 68 | 465 | Stenosis | 15 | 67 |
| 4 | 67, M | CRT | 70 | 365 | Minor infection | 14 | 18 |
| 5 | 77, M | CRT | 60 | 558 | — | 10 | 31 |
| 6 | 69, M | CRT | 70 | 497 | — | 15 | 21 |
| 7 | 58, M | CRT | 70.2 | 537 | — | 13 | 23 |
| 8 | 75, M | CRT | 70 | 549 | — | 14 | 20 |
| 9 | 68, M | CRT | 70 | 444 | Minor infection | 13 | 28 |
| 10 | 78, M | CRT | 70 | 506 | Major infection | 26 | 55 |
| 11 | 65, M | ESD, CRT | 70 | 642 | Arterial thrombosis | 35 | 71 |

CRT, chemoradiotherapy; EMR, endoscopic mucosal resection; ESD, endoscopic submucosal dissection; RT, radiotherapy.

and the cervical esophagus in 1 patient. Previous treatment consisted of chemoradiation therapy in 9 patients and radiation therapy in 2 patients. The total dose of radiation therapy ranged from 60 to 72 Gy. Five patients had a history of diabetes mellitus.

The median operative time was 497 minutes (range, 365–642 minutes). The median blood loss was 225 ml (range, 99–501 ml). Postoperative complications occurred in 7 patients. One jejunal flap was lost because of arterial thrombosis on postoperative day 2 (patient 11). The arterial thrombosis occurred in the anastomotic site, which we thought that had been caused by arteriosclerosis. This patient required an additional jejunal transfer using the thoracoacromial artery and the cephalic vein as recipient vessels, with resection of the clavicle. Additionally, a pectoralis major muscle flap and skin graft were applied to cover the damaged esophagus and the clavicle stump. One patient with antiphospholipid antibody syndrome showed flap congestion on postoperative day 7 (patient 2). An exploratory incision revealed no thrombosis at the venous anastomosis site. The patient was treated conservatively and the jejunal flap survived, although the mucous membrane was necrotic. A contrast swallow examination showed slight anastomotic leakage on postoperative day 21; however, the patient started oral intake on the same day and showed no clinical symptoms of infection or inflammation. The other 9 patients had no microvascular problems. One patient developed a major infection that was treated with incision and drainage, which delayed the start of oral intake (patient 10). Another patient developed a major infection, and 2 patients developed minor infections; resumption of oral intake was not delayed in any of these patients. The median hospitalization period was 28 days (range, 18–71 days) from the day of operation.

## DISCUSSION

In our study, 9 of 10 patients with a history of radiation therapy (excluding the 1 patient who underwent reoperation) showed no anastomotic leakage when a stripped mesenteric flap was used. Although 1 patient developed anastomotic leakage caused by congested mucous membrane necrosis, the patient began oral intake on postoperative day 21 without symptoms of infection or inflammation. Sugiyama et al.[1] reported that anastomotic leakage occurred in 11.3% of 773 Japanese patients. Our results were consistent with those reported, despite prior radiation therapy. Previous reports have described covering the anastomotic site with a muscle flap such as a pectoralis major muscle flap, a seromuscular patch, or a mesenteric flap.[3,4,7–9] Of these options, the pectoralis major muscle flap entails additional morbidity. The mesenteric flap is used to wrap the anastomotic site and obliterate dead space.[4,7,8] There is no need to perform an additional incision. A stripped mesenteric flap requires only an additional 10 minutes of procedure time. As shown in Figure 2, the flexibility of the mesenteric flap increases as a result of stripping off the serosal membrane, enabling coverage of the anastomotic site without dead space. When the serosal membrane is stripped off, fibrin deposition increases, formation of the fibrin network accelerates, and adhesion occurs more rapidly.[10]

The main limitation of this study is the small sample size. Conclusive data cannot be obtained from a series of 11 patients. There was a selection bias as a consequence of the retrospective nature of our study. Nevertheless, this procedure might be helpful in preventing anastomotic leakage in patients with a history of prior radiotherapy.

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## ACKNOWLEDGMENTS

*The authors thank Angela Morben, DVM, ELS, and Andrea Baird, MD, from Edanz Group (www.edanzediting.com/ac), for editing drafts of this article.*

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